

JI monitoring report form
Monitoring period: 01.01.2008 – 31.12.2008

Version: 05 dated 12.04.2010

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Section A. General information on project activities and monitoring information

A.1. Title of the project activity

“Reconstruction of Kramatorsk heat and power plant”

A.2. JI registration number

The JI project “Reconstruction of Kramatorsk HPP” has received the Letter of Approval from Ukraine, reference 1469/23/7 dated 04.12.2009. The Investor Country Letter of Approval (Germany) is issued on 25.03.2010.

JI registration number: UA1000156

A.3. Short description of the project activity

According to the data of Kramatorsk HPP as a result of implemented reconstruction of HPP and rehabilitation of heat supply network the following natural gas saving in 2008 will occur:

Natural gas savings from HPP reconstruction, 25 272
ths. m³

Natural gas saving from heat supply network
rehabilitation, ths. m³ 1010

A.4. Monitoring period

Starting date: 01.01.2008

Closing date: 31.12.2008

A.5. Methodology applied to the project activities

A.5.1. Baseline methodology

For determination of the baseline the JI specific approach based on approved methodology ACM0002 «Consolidated methodology for grid-connected electricity generation from renewable sources» (version 10) is used.

A.5.2. Monitoring methodology

For monitoring of JI project the JI specific approach based on monitoring methodology ACM0002 «Consolidated methodology for grid-connected electricity generation from renewable sources» (version 10) is used.

A.6. Status of implementation, including time table for major project parts

№	Measures	Beginning of design stage	Beginning of construction	Commissioning
1	Reconstruction of boiler № 7	–	September 2008	January 2009
2	Reconstruction of boiler № 9		April 2008	November 2008
3	Modernization of turbine PT-60-90/13 st. №3	September 2007	April 2008	August 2008
4	Modernization of turbine PT-60-90/13 st. №4	September 2008	April 2009	August 2009
5	Reconstruction of cooling tower № 1	May 2006	June 2008	September 2008
6	Capital repair of boiler-rooms with replacement of tubes and valves	April 2008	June 2008	November 2008
7	Replacement of capacitive heat exchangers by lamellar - 35 units 40 units 65 units 60 units	May 2008 May 2009 May 2010 May 2011	July 2008 July 2009 July 2010 July 2011	November 2008 November 2009 November 2010 November 2011
8	Replacement of heat supply pipelines by pipelines from polyurethane foam	June 2008	June 2008 2009 2010 2011 2012	November 2008 2009 2010 2011 2012
9	Replacement of the feeding pump	-	May 2007	April 2009

Table 1. Status of implementation (according to PDD version 2.2)

Changes to the schedule are not foreseen.

A.7. Intended deviations and revisions to the registered PDD

The amount of generated electric and heat power in the baseline and project scenario pointed in the registered PDD has been changed. It happened because during the PDD development the expected data for 2008 has been given, which differs from actual data in 2008. In the table 2 actual data on heat and power generation in 2008 are given.

Item	2008
Power generation, MWh	313 284
Heat generation, Gcal	539 037

Table 2. Heat and power generation for baseline scenario for the project

A.8. Intended deviations and revisions to the registered monitoring plan

There are no deviations to the registered monitoring plan.

A.9. Persons responsible for preparation and submission of monitoring report

The persons responsible for the preparation of the Kramatorsk HPP monitoring report: the First deputy director, Mr. V.S. Potapenko (management); the Head of Production department Mr. A.M. Gusev (in charge for the report preparation).

Section B. Key monitoring activities

B.1.1. Monitoring and control system

The control and monitoring system is divided into three main parts:

- 1) Electrical measurement;
- 2) Heat measurement;
- 3) Fuel measurement (natural gas, coal).

Electrical measurement

For this project the following electrical measurements are necessary: total generated power, power consumption for the own needs of HPP, power supplied to the consumers.

There are 3 technical electricity meters at the HPP which measure the electricity generated by turbines.

There are 114 technical electricity meters which measure power consumption for the own needs of HPP.

There are 14 commercial electricity meters which measure the amount of power supplied to the consumers.

Generated power and power supplied to the consumers is present in the reports on generation and supply to the grid and in the extracts from registration journal of the HPP as well as in the reports on power distribution.

Heat measurement

The HPP is equipped with heat measurement devices, which allow determining the amount of heat supplied to the consumers. The amount of heat generated at the HPP is also present in the journal of heat supplied to the consumers.

To determine the heat savings from heat supply network rehabilitation the data on heat supply from each 4 boiler-rooms is used. Data on heat supply to the consumers from boiler-rooms is saved in the journal of accounting of heat supplied to the consumers (boiler-rooms' data).

To determine the amount of heat generated by boilers №№ 7, 9 the data on generated steam by these boilers is used. The HPP is equipped by special flow-meters which measure the amount of generated steam by boilers №№ 7, 9.

Measurement of fuel consumption (natural gas, coal)

Measurement of natural gas consumption

The volume of consumed gas is measured by means of “Universal-02” gas flow meter. The meter’s software is intended for transformation of the incoming signals from the gas flow meters, vortex converters of consumption, transformation and measuring of incoming signals from converters of measured pressure and gas temperature, calculation and reduction with accordance to conditions set in GOST 2939-63 (standard conditions) of its volume and volume consumption. “Universal-02” gas flow meter is allowed for serial production and use in Ukraine and is entered into state register under the reference Y759-01.

“Universal-02” gas flow meter keeps in its memory the archives of parameters which are combined into hourly and daily archives of energy carriers’ consumption, emergency cases and access to the operative memory device with possibility of its transfer to a PC via RS232 or RS485 interfaces for further processing and printing.

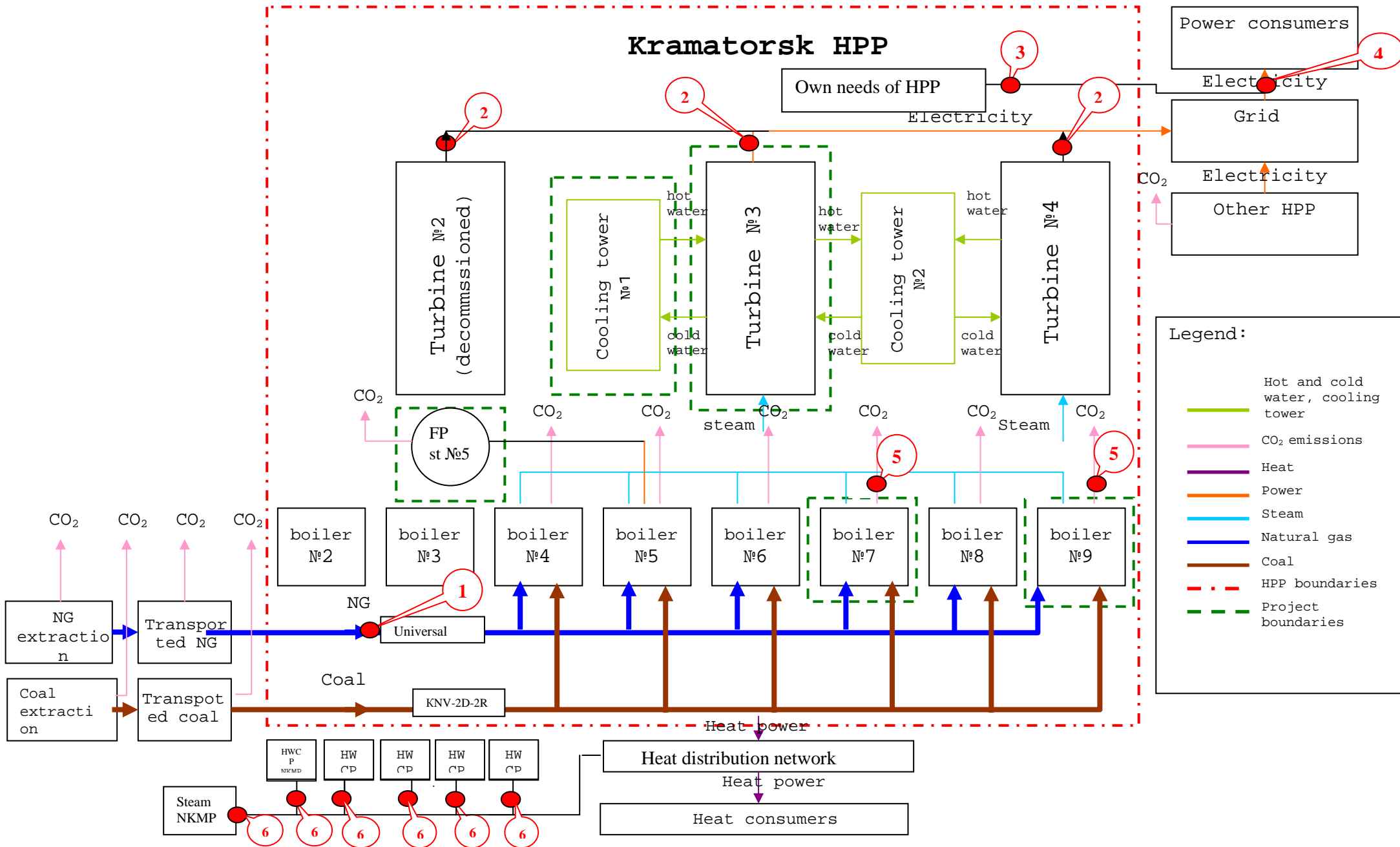
Data on quality of natural gas (physical and chemical indicators) are put into the program “Universal-02” manually according to a quality passport or a telephone message (in case of indicators changes) given by Kramatorsk Department of gasification and gas supply.

The supply reports of natural gas, diagrams of fuel and journals of fuel accounting are used for cross-checking the amount of consumed natural gas.

Measurement of coal

In 2008 the arrival of coal had been controlled by means of RS-150C13V mechanical car scale, which was leased from Novokramatorsk machine building plant (NKMB). The reserves of coal at the store for the campaign period are measured by independent experts. Coal amount is calculated by means of accounting of coal carrier’s capacity and content of the bunkers. Coal remains are measured during quarterly inventories. For cross-check of the data on consumed coal the acts of measurement of coal and journal of fuel accounting are used. However, the primary data source is the data of measurement of coal by the scales.

The scheme of measuring devices location which controls the abovementioned parameters is given below in Figure 1.



Note: 1 - «Universal-02» gas flow meter 3- technical flow meters of power for own needs 5 – devices of generated steam measuring
 2- technical flow meters of generated power 4 – commercial flow meters of power supplied to the grid 6 - devices of heat carrier accounting
 HWCP - heating water converter plant; FP-feeding pump.

B.1.2. Information on equipment used

The control and monitoring system is divided into three main parts:

- 4) Electrical measurement;
- 5) Heat measurement;
- 6) Fuel measurement (natural gas, coal).

1) Electricity measurements

For this project the measurement of the following electrical parameters are necessary: total generated power, power consumption for own needs of HPP, power supplied to consumers.

The measurement of generated power

In table 3 the data on meters which measure generated power is given.

Measurement device	Producer (company, country)	Work parameter	Serial number	Accuracy rate %	Installation date	Data as of 01.01.2008	Data as of 31.12.2008	Date of last calibration	Date of next calibration	Installed at	Remarks
Technical electricity meter GANZ (0,7)	Hungary	Wa (active capacity)	289410	0.7	05.2004	GANZ, 148561	SL7000(0.2s) №36132321, 148561	IV-2007	IV-2013	TG-2	
Technical electricity meter CE6808V(0,2s)	Energomera, Russia	Wa	30114046	0.2s	05.2004	CE6808V, 658410	SL7000(0.2s) №36132304, 801501	III-2007	III-2013	TG-3	
Technical electricity meter CE6808V(0,2s)	Energomera, Russia	Wa	3597476	0.2s	05.2004	CE6808V, 579988	SL7000(0.2s) №36130059, 763190	III-2007	III-2013	TG-4	
Technical electricity meter CE6805V(0,5s)	Energomera, Russia	Wa	B052622	0.5s	04.2004	SAZU-I-681	CE6808V	III-2004	III-2010	SMV-6 GRU-1	This meter is not used in the calculations of the electricity supplied to customers/grid; its data is not recorded.

Table 3. Data on meters for generated power measurement

Measurement of power supplied to consumers

In the table 4 data on electricity meters which measure the amount of power supplied to the consumers is given.

Measurement device	Producer (company, country)	Work parameter	Serial number	Accuracy rate %	Installation date	Data 01.01.2008	Data 31.12.2008	Date of last calibration	Date of next calibration	Installed at
Commercial electricity meters EA02RAL X (0.5) – 8 units–used for calculation	ABB BEI Metronika Russia	Wa ,Wp	01073888	0,2s	4.08.09	96835	159893	I-2009	I-2015	LIP-1
		Wa ,Wp	01076223	0,2s	4.08.09	52270	114070	I-2009	I-2015	LIP-2
		Wa ,Wp	01083013	0,2s	4.08.09	1046431	1238434	I-2009	I-2015	.-1
		Wa ,Wp	01054389	0,2s	4.08.09	0	130621	I-2009	I-2015	Dr.-2
		Wa ,Wp	01082976	0,2s	29.09.03	1934608	2398030	III-2003	III-2009	Kuib.-1
		Wa ,Wp	01083001	0,2s	29.09.03.	2522833	3317789	III-2003	III-2009	Kuib.-2
		Wa ,Wp	01166656	0,2s	28.12.07	12168	1243302	IV-2007	IV-2013	NKMP-3
Commercial electricity meters SL7000 (0,2s)-6 units-used for cross checks	Aktaris Ukraine	Wa ,Wp	36132291	0,2s	01.2008			III-2007	III-2013	LIP-1
		Wa ,Wp	36132287	0,2s	01.2008			III-2007	III-2013	LIP-2
		Wa ,Wp	36132318	0,2s	01.2008			III-2007	III-2013	Dr.-1
		Wa ,Wp	36132234	0,2s	01.2008			III-2007	III-2013	Dr.-2
		Wa ,Wp	36130050	0,2s	01.2008			III-2007	III-2013	Kuib.-1
		Wa ,Wp	36130053	0,2s	01.2008			III-2007	III-2013	Kuib.-2

Table 4. Data on electricity meters for power supplied to the consumers

Measurement of power used for own needs of HPP

Power consumption for own needs of HPP is calculated as difference between generated power and power supplied to the consumers from the plant buses.

2) Heat measurement

Data on measurement devices for heat supplied to the consumers from Kramatorsk HPP is given in the table 5.

The measurement of heat supplied to the consumers

Measurement device	Producer (company, country)	Work parameter	Serial number	Accuracy rate %	Installation date	Generated heat, Gcal	Date of last calibration	Date of next calibration	Remark
1	2	3	4	5	6	7	8	9	10
Additional feeding HWCP №3 SVTU-10M Supply HWCP №3 SVTU -10M	Kyiv, Company «Sempal Ko Ltd»	Heat	12018	2.0	21.11.08	67 043	07.05.07	07.05.11	The amount of generated heat is received as accumulated result per year
		Heat	14295	2.0	21.11.08	2845	04.08.08	04.08.12	
Additional feeding HWCP №4 SVTU-10M Supply HWCP №4 SVTU-10M	Kyiv, Company «Sempal Ko Ltd»	Heat	11815	2.0	21.11.08	100 147	07.05.07	07.05.11	The amount of generated heat is received as accumulated result per year
		Heat	14357	2.0	21.11.08	4817	04.08.08	04.08.12	
Additional feeding HWCP №5 SVTU-10M	Kyiv, Company «Sempal Ko Ltd»	Heat	14135	2.0	21.11.08	224 991	24.06.08	24.06.12	The amount of generated
		Heat	14262	2.0	21.11.08	10060	05.08.06	05.08.12	

Supply HWCP №5 SVTU-10M		Heat							heat is received as accumulated result per year
Additional feeding HWCP №6 SVTU -10M	Kyiv, Company «Sempal Ko Ltd»	Heat	11757	2.0	21.11.08	338 615	07.05.07	07.05.11	The amount of generated heat is received as accumulated result per year
Supply HWCP №6 SVTU-10M		Heat	14390	2.0	21.11.08	17167	05.08.08	05.08.12	
Additional feeding HWCP № 2 SVTU-10M	Kyiv, Company «Sempal Ko Ltd»	Heat	11911	2.0	21.11.08	33 864	07.05.07	07.05.11	The amount of generated heat is received as accumulated result per year
Heat energy supply to NKMP Additional feeding : Leakage	«Spetssystemy» Belarus	Water consumption for additional feeding	0609009	0,4	14.12.06	No data	28.09.06	28.09.10	Passport
UVR-011	Kharkiv city, JSC «Tahion»	Network water consumption	1080	1,0	14.12.06	No data	26.08.08	26.08.10	Passport
TSP-Metran-206	CJSC PG «Metran»	Temperature of network water	565545	B	14.12.06	No data	18.08.08	18.08.09	Passport
TSP-Metran-206			565546	B	14.12.06		18.08.08	18.08.09	

Table 5. Data on flow meters of heat supplied to consumers

Data on the amount of steam generated by boiler №№ 7, 9 is used for calculation of heat generated by boilers №№ 7, 9. Information on measuring devices for steam generated by boilers №№ 7, 9 is given in the table 6.

Measurement device	Producer (company, country)	Work parameter	Serial number	Accuracy rate %	Installation date	Data 01.01.2008	Steam generated by boilers №№7,9	Date of last calibration	Date of next calibration	Remarks
Boiler №7 Secondary RP160-09 Primary DM 3583 M	Ukraine, Lviv	Superheated vapour	1120476	1.0	10.09.08	No summator	735 173	07.09.08	07.09.09	Passport
			12048	1.5						
Boiler №9 Secondary RP160-09 Primary DM 3583 M	Ukraine, Lviv	Superheated vapour	2091175	1.0	15.02.01	No summator	204 804	19.02.09	19.02.10	Passport
			14176	1.5						

Table 6. Data on flow meters of steam generated by boiler №№ 7, 9

3) Fuel measurement

Natural gas measurement

Data on “Universal-02” gas flow meter is given in the table 7.

Measurement device	Producer (company, country)	Work parameter	Serial number	Accuracy rate %	Installation date	Natural gas consumption, ths. m ³	Date of last calibration	Date of next calibration	Remarks
Universal-02	GVP «GREMPIS», Ltd. Vinnitsa Ukraine	Natural gas consumed by boilers	5672	0,2	02.09.07	110 234	29.07.09	29.07.11	Passport

Table 7. Data on “Universal-02” natural gas flow meter

Coal measurement

Data on RS-150C13V mechanical car scale used for consumed coal measuring is given in table 8.

Measuring device	Producer (company, country)	Work parameter	Serial number	Installation date	Date of last calibration	Date of next calibration
RS-150C13V mechanical car scale	Odessa, Ukraine	Coal consumption	0011	12.05.09	12.05.09	12.05.10

Table 8. Data on RS-150C13V mechanical car scale for measuring of coal amount

B.1.3 Calibration procedure

For power meters

Data on calibration of meters used for measuring of total power generation is given in the table 9.

Parameter	Answer (passport data)
Interval between calibrations	6 years
Methodology of procedure of calibration of meters of total power generation	Methodology of Ukrainian Center on standardization and metrology
Period of warranty from the producer	18 months (SL7000)
Body responsible for calibration and certification of the measuring equipment	Methodology of Ukrainian Center on standardization and metrology

Table 9. Data on calibration of electricity meters for total power generation

Data on calibration of electricity meters used for measuring power consumption for own needs of HPP is given in the table 10.

Parameter	Answer (passport data)
Interval between calibrations	6 years
Methodology of procedure of calibration of meters of power consumed for own needs	Methodology of Methodology of Ukrainian Center on standardization and metrology

Period of warranty from the producer	18 months (SL7000)
Body responsible for calibration and certification of the measuring equipment	Ukrainian Center on standardization and metrology

Table 10. Data on calibration of electricity meters used for measuring of power consumed for own needs of HPP

Data on calibration of electricity meters used for measuring of power supplied to consumers is given in the table 11.

Parameter	Answer (passport data)
Interval between calibrations	6 years
Methodology of procedure of calibration of meters of power supplied to consumers	Methodology of Ukrainian Center on standardization and metrology
Period of warranty from the producer	18 months (SL7000)
Body responsible for calibration and certification of the measuring equipment	Ukrainian Center on standardization and metrology

Table 11. Data on calibration of electricity meters used for measuring of power supplied to consumers

Measuring devices of heat and generated steam

Data on calibration of flow-meters used for generated steam by boilers №№ 7, 9 is given in the table 12.

Parameter	Answer (passport data)
Interval between calibrations	1 year
Methodology of procedure of calibration of flow-meters of steam generation	Methodology of State standard
Period of warranty from the producer	1 year
Body responsible for calibration and certification of the measuring equipment	Derzhstandartmetrologiya

Table 12. Data on calibration of flow meters used for measuring steam generation by boilers №№ 7, 9.

Data on calibration of meters for measuring generated heat is given in the table 13.

Parameter	Answer (passport data)
Interval between calibrations	4 years
Methodology of procedure of calibration of	Methodology of calibration testing is

meters of heat generation	ShIMN.407251.003 I2
Period of warranty from the producer	48 months
Body responsible for calibration and certification of the measuring equipment	Derzhstandartmetrologiya

Table 13. Data on calibration of heat meters of generated heat

Fuel measuring devices

Measuring of natural gas amount

Data on calibration of “Universal-02” natural gas flow meter is given in the table 14.

Parameter	Answer (passport data)
Interval between calibrations	2 years
Methodology of procedure of calibration of flow-meters of natural gas consumption	Methodology of state metrological attestation GREM.02 0000.001-01.01 PMA and guidance on operation
Period of warranty from the producer	18 months
Body responsible for calibration and certification of the measuring equipment	Derzhstandartmetrologiya

Table 14. Data on calibration on “Universal-02” natural gas flow meter

Measuring of coal consumption

Data on calibration of RS-150C13V mechanical car scale is given in the table 15.

Parameter	Answer (passport data)
Interval between calibrations	1 year
Methodology of procedure of calibration of meters of coal consumption	Calibration testing is done by balance receiver.
Period of warranty from the producer	15 years
Body responsible for calibration and certification of the measuring equipment	Derzhstandartmetrologiya

Table 15. Data on calibration of RS-150C13V mechanical car scale

B.1.4. Involvement of Third Parties

Ukrainian Center on standardization and metrology.

B.2. Data collection (accumulated data for whole monitoring period)

The structure of operation and management of the project is given in the PDD in the figure 2 “Scheme of data collection according to the monitoring plan”.

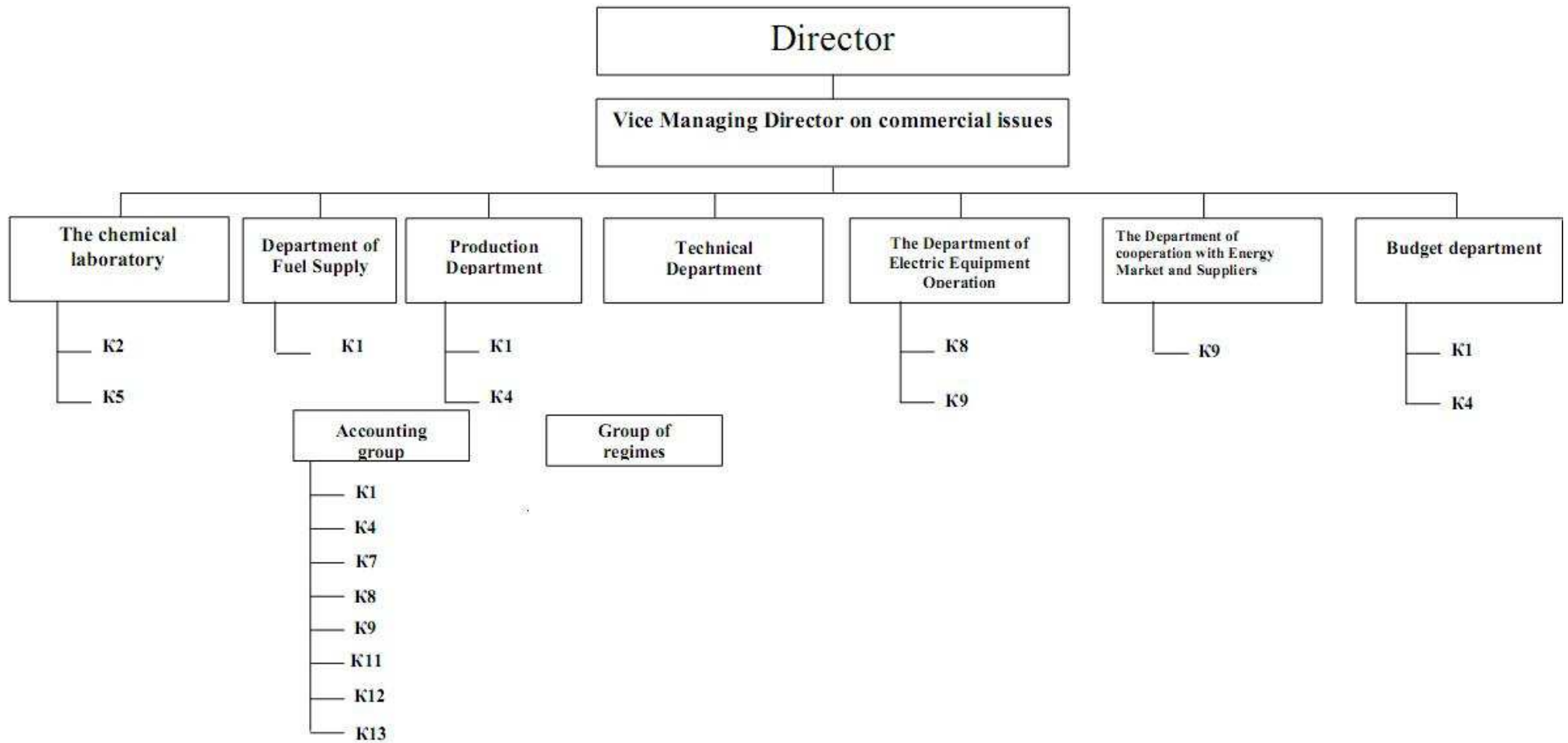


Figure 2. Data collection for the monitoring

B.2.1. List of other parameters use during the calculation

During the calculation the other parameters which are not measured by measuring equipment are used. These parameters are listed in the table 16 below.

Identification number	Variable	Source of data	Unit	Comment
K2	Net calorific value of coal	Kramatorsk HPP	kcal/kg	Provided in the invoices of fuel supplier, checked by the laboratory of chemical analysis
K3	Carbon emission factor for coal	IPCC	t C/TJ	IPCC values are given in Section 2 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 2 (Energy), Table 2.2 Default emission factors for stationary combustion in the energy industries)
K5	Net calorific value of natural gas	Kramatorsk HPP	kcal/m ³	Provided in the passport of fuel supplier
K6	Carbon emission factor for natural gas	IPCC	t C/TJ	IPCC values are given in Section 2 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 2 (Energy), Table 2.2 Default emission factors for stationary combustion in the energy industries)
K10	Carbon emission factor of the electric grid of Ukraine	Baseline study of UES of Ukraine	t CO ₂ /kWh	Carbon emission factor for national grid of Ukraine is given in JI PDD 0018 «Energy saving programme at “Istil” mini steel mill, Ukraine»

Table 16. Parameters used during GHG emissions calculation

B.2.2. Data concerning leakages

Leakages are not foreseen.

B.3. Data processing and achieving

All data will be processed and achieved in electronic and/or paper view.

B.4. Special event log and technological breakdowns

In 2008 at HPP there were a few technical breakdowns.

On March 4, 2008 in connection with lowering of vacuum level at the emergency turbine switch ('KAOT') the operational personnel cut off turbo generator №4 from the grid. The reason was lowering of vacuum is reduction of load by circulating pump of the type 24 NDN. The breakdown is liquidated by reserve equipment.

On the 7th of August 2008 at HPP the break of furnace tube №19 of middle block of side water wall had happened. The length of split is 80 mm, the width is 30 mm in the area of manway by the fiery side. The breakdown was liquidated by means of reserve equipment operation.

On September 9th, 2008 the hole had appeared at the weld at the connecting branch of surface drainage of main steam line of transfer. Working boilers № 5 and turbogenerator № 4 were switched off by operational personnel. The breakdown was liquidated by means of reserve equipment operation.

On October 9th, 2008 a part of pipe of middle block of face of the boiler №5 of the type TP-170 had broken down. The reason is inner corrosion of the pipe's material (metal). The boiler will be switched off by automatic protection by the water level in the drum of boiler. The personnel switched off KAOT of turbogenerators №№ 3, 4 in connection with no-steam regime.

On November 3rd, 2008 the breakdown of bearing block of circulation pump №1 of turbogenerator №3 and refusal from closing of electric damper valve at the draw of circulation pump №2 had caused the lowering of vacuum and switch off of turbines by protection by the vacuum. The reason is breakdown of bearing part.

B.5. Procedures for emergency and malfunction handling at Kramatorsk HPP

All malfunctions identified by the staff of Kramatorskteploenergo LLC is recorded into the journals. The department for production procedures, represented by the head of the technical department, commissions internal repair division or an external contractor (depending on the nature of the malfunction), and makes the equipment check after the repair works.

B.6. External data (type of data, source, access)

The only external data used in the project are the parameters of the mechanical track scale RS-150C13V (accuracy, commissioning date, dates of the last and the following calibration and so on). The RS-150C13V scale belongs to JSC 'Novokramatorsk Machine Building Plant' and is physically located on its territory. The Department of the chief power engineer at JSC NKMB is responsible for this external data. JSC NKMB provides this data to the Head of the Department of fuel supply of Kramatorskteploenergo LLC, who is responsible for the fuel acceptance.

B.7. Accuracy level of the measurement equipment

Every type of measurement equipment has its defined accuracy level. As a rule, this level is low. The accounting for inaccuracies at the HPP is regulated by the 'Instruction on the rules for commercial accounting of electricity', which is an integral part of the current agreement between the members of the Wholesale electricity market of Ukraine. The inaccuracy level of the electricity measurement devices is kept below 0.5%.

The measurement equipment used for commercial accounting of Kramatorskteploenergo LLC are in compliance with the accuracy level mentioned above. The accuracy of the fuel volumes received by Kramatorskteploenergo LLC is stated in the relevant certificates provided by the supplier; the forms of these certificates are agreed between the consumer, suppliers and with

the State Enterprise Derzhstandartmetrologiya (based in Donetsk and Dnipropetrovsk). For the natural gas measurements the accuracy level is 1%, for the hard fuel – 1.5%. Therefore, the acceptable level of the inaccuracy of the measurements, for which no correction is necessary within the calculations provided below, is set.

Section C. Quality assurance and quality control measures

C.1. Documented procedures and management plan

C.1.1. Roles and responsibilities

The general project management is done by the General Director of Kramatorsk HPP and the First Deputy Director. The Director manages and coordinates activity of all departments. Every parameter is monitored by the respective department headed by the Head of the department.

The organizational structure of the data collection at Kramatorsk HPP is presented above in the Section B.2.

C.1.2. Training

With the purpose of operation of modernized equipment of Kramatorsk HPP the studying of 6 people of operational personnel of “Kramatorskteploenergo”, Ltd. was done at the boiler equipment of the type BKZ-220 of Chernihiv HPP. The cost of training is UAH 21 000.

C.2. Internal audit and control measures

A system of technical tools ‘KTS Energiya’ is used at Kramatorsk HPP as the main internal control instrument. The system is managed by the department of information technologies and communication. The data is collected with the minimum range of 5 minutes for each technological parameter. The system archives the information collected and keeps the archived data for at least one year. The data is collected by the accounting group of the production department.

C.3. Information on the social and environmental impacts of the project

As a result of the project implementation, the local community and the employees of Kramatorsk HPP will have secure workplaces for the long-term perspective, due to the stable operation of the plant. The consumption of the fossil fuels for heat and power generation will be reduced. The project’s implementation will lead to reduction of greenhouse gas and other toxic gases (such as carbon monoxide and nitrogen oxides) emission to the atmosphere. Reducing the amount of greenhouse gas emissions would allow to prevent their further accumulation in the atmosphere and therefore contribute to the climate change mitigation.

Section D. Emission reductions calculations

D.1.1 Project emissions

Project emissions (E_p) are calculated by the following formula:

$$E_p = PE_{FC,elec,y} + PE_{heat_ex}$$

where:

$PE_{FC,elec,y}$ – project emissions from the actual fuel consumed by the power plant for the heat and power production (savings from heat distribution network rehabilitation are not taken into account), t CO₂.

PE_{heat_ex} – project emissions from electricity consumption by the boiler rooms where the heat exchangers are to be replaced, t CO₂.

The emissions after implementation of the project measures are presented below in Table 17.

Year	2008
Emissions, t CO₂e	349 630

Table 17. Project emissions, t CO₂e

D.1.2. Baseline emissions

The following formula is used for calculating the baseline emissions at Kramatorsk HPP (BE_y):

$$BE_y = BE_{FC,elec,y} + BE_{electricity,y} + BE_{heat_ex}$$

where:

$BE_{FC,elec,y}$ – baseline emissions from the fuel combusted at the power plant for heat and power production in the absence of project measures, t CO₂. Emissions from different fuel types are calculated by multiplying the amount of the fuel of the type ‘i’ by the carbon emission factor (t CO₂ / t (1000 m³)) for the fuel I consumed during the year y.

$BE_{electricity,y}$ – baseline emissions from the grid electricity to be replaced due to the project implementation at the power plant, t CO₂.

BE_{heat_ex} – baseline emissions from electricity consumption by the boilers, where the heat exchangers are to be replaced, t CO₂.

Baseline emissions for the scenario of absence of the project measures are given in the table 18 below.

Year	2008
Baseline emissions, t CO₂e	399 288

Table 18. Baseline emissions, t CO₂e

D.1.3. Leakage

No leakage is expected within the project.

D.1.4. Emission reductions in 2008 due to the project implementation

Emission reductions due to the project implementation are calculated as the difference between the baseline and the project emissions.

Emission reductions due to the project implementation are given in the table 19 below.

Year	2008
Emission reductions, t CO₂e	49 658

Table 19. Emission reductions